

## Daniel Haskel, Ph.D.

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### RESEARCH INTERESTS AND SPECTROSCOPIES

Magnetic materials, Interplay between structure and magnetism, Magnetism at high pressures, Interfacial magnetism, Local structure, Phase transitions, Superconductivity, X-ray Magnetic Circular Dichroism (XMCD), X-ray Resonant Magnetic Scattering (XRMS), X-ray Absorption Fine Structure (XAFS).

### CURRENT RESEARCH ACTIVITIES

Development of novel polarized x-ray techniques enabling studies of the interplay between structure and magnetism in complex, functional magnetic materials. This includes extension of x-ray magnetic circular dichroism (XMCD) and polarized x-ray absorption near-edge/fine structure (XANES/XAFS) techniques to the diamond-anvil cell for high pressure studies of electronic structure and magnetism; Magnetic Reflectivity for studies of interfacial magnetic structure and depth-resolved magnetization profiles in artificial layered nanostructures, and magnetic diffraction anomalous fine structure (MDAFS) for studies of element- and site- specific magnetism in single crystalline bulk and film samples.

### EMPLOYMENT/POSITIONS

Adjunct Professor of Physics, Washington University in St. Louis	Feb 2015-Present
Group Leader, Magnetic Materials Group Argonne National Laboratory	Jan 2013-Present
Adjunct Associate Professor of Physics, Washington University in St. Louis	June 2010-Feb 2015
Physicist –Argonne National Laboratory	May 2005- May 2006
Assistant Physicist –Argonne National Laboratory	May 2001-May 2005
Post-doctoral Research Associate Argonne National Laboratory University of Washington	August 1999- May 2001 March 1998 - July 1999

### EDUCATION

Ph.D. in Physics	University of Washington	1998
Thesis: <i>Local structural studies of oriented high temperature superconducting cuprates by polarized XAFS spectroscopy</i> (Advisor: Edward A. Stern)		
M.Sc. in Physics	Technion, Israel	1992

Thesis: *Effect of impurities on dynamical properties of dilute metallic binary alloys.* (Advisor: Hanan Shechter)

B.Sc. in Physics

Technion, Israel

1989

## RESEARCH EXPERIENCE

**High pressure XMCD studies in the diamond-anvil cell:** Developed a high-pressure (1 Mbar), low-temperature (1.4 K), in-field (6.5 Tesla) capability for XANES/XMCD-studies of magnetic materials at high pressures. The instrument features a diamond-anvil cell with perforated anvils to minimize anvil's absorption, remote control of piston-motion via a gas membrane allowing *in-situ* pressure control at low temperatures and an online Ruby fluorescence system for *in-situ* pressure calibration at low temperatures. Studied pressure-induced magnetic transitions in a variety of materials including complex oxides, magneto-caloric materials and transition and rare-earth metals. [*Phys. Rev. Lett.* 109, 027204 (2012); *Phys. Rev. Lett.* 109, 026403 (2012); *Phys. Rev. B.* (Rapid Communications) 84, 100403(R) (2011); *Phys. Rev. Lett.* 100, 045508 (2008); *Phys. Rev. Lett.* 102, 057206 (2009), *High Pressure Research* 28, 185 (2008); *Review of Scientific Instruments* 78, 083904 (2007); *Phys. Rev. B* 76, 014411 (2007)].

**X-ray studies of element- and site-specific magnetism in single crystals:** Exploited the symmetry properties of crystals in combination with resonant scattering of circularly polarized (CP) x-rays to obtain site-selective magnetic information in single crystals. This technique allowed measuring site-selective magnetization reversals in permanent magnetic materials providing an atomic look at the origins of magneto-crystalline anisotropy in best permanent magnet Nd<sub>2</sub>Fe<sub>14</sub>B [*Phys. Rev. Lett.* 95, 217207 (2005); *IEEE Transactions on Magnetics* 40, 2874 (2004); *Phys. Rev. B* 73, 144416 (2006); *Phys. Rev. B* 74, 104114 (2006); *Appl. Phys. Lett.* 93, 052504 (2008)]. Developed a digital lock-in detection system for dichroic diffraction of CP x-rays (U.S. Patent 7,403,592 issued July 2008).

**X-ray studies of interfacial magnetism:** Combined x-ray resonant magnetic scattering and magnetic circular dichroism techniques to measure and quantify the spatial extent and strength of magnetic exchange coupling at buried interfaces of layered structures. These techniques revealed the existence of induced Gd magnetization near the Gd/Fe interface and determined its spatial extent. Generalized computer codes were developed to retrieve magnetization density profiles from layered structures within the first Born approximation, and to obtain anomalous magnetic scattering factors from XMCD measurements [*Phys. Rev. Lett.* 87, 207201 (2001); *Physical Review B* 70, 134420 (2004); *Appl. Phys. Lett.* 91, 022503 (2007); *App. Phys. Lett.* 92, 162502 (2008) *Physical Review B* 79, 134438 (2009)].

**X-ray studies of inhomogeneous magnetic states in artificial nanostructures:** Combined x-ray Magnetic Circular Dichroism (XMCD) with penetration depth tunability of x-rays near the critical angle for total external reflection to probe the nucleation of magnetic twisted phases in Gd/Fe multilayers. This method allowed probing near-surface and bulk magnetic states in a single measurement and revealed the nucleation of a spatially inhomogeneous magnetic state at the surface of an artificial Gd/Fe multilayer [*Phys. Rev. B (Rapid Communications)* 67, 180406(R) (2003); *J. Appl. Phys.* 93, 6507 (2003); *Phys. Rev. B* 73, 174401 (2006)].

**XAES studies of the local structure of high T<sub>c</sub> superconductors:** Used the orientation dependence of X-ray Absorption Fine Structure (XAES) in the anisotropic layered structures of high T<sub>c</sub> superconductors to measure local atomic arrangements at structural phase transitions and around dopant atoms. Developed methods for preparation of magnetically aligned powders for fluorescence experiments. These measurements revealed, among others, the partial order-disorder nature of the Sr-induced phase transition in La<sub>2-x</sub>Sr<sub>x</sub>CuO<sub>4</sub> [*Phys. Rev. Lett.* 76, 439 (1996)], the polaronic nature of hole carriers doped by Sr in La<sub>2-x</sub>Sr<sub>x</sub>CuO<sub>4</sub> [*Phys. Rev. B (Rapid Communications)* 56, R521 (1997)], the high spin non Jahn-Teller state of Ni in La<sub>2-x</sub>Sr<sub>x</sub>Cu<sub>1-y</sub>Ni<sub>y</sub>O<sub>4</sub> [*Phys. Rev. B* 64, 104510 (2001)] and the large local disorder in tilt angle of CuO<sub>6</sub> octahedra present in La<sub>1.875</sub>Ba<sub>0.125</sub>CuO<sub>4</sub> [*Phys. Rev. B* 61, 7055 (2000)].

**Electron microscopy studies of local atomic structure of materials:** Contributed to the development of the EXELFS technique (Extended Energy Loss Fine Structure) as a structural tool with high spatial resolution (50Å -1μm) in the Transmission Electron Microscope (TEM). Main contributions include improvements in data analysis and quantifying the effect of electron radiation damage as a limitation to high spatial resolution [*Micron* **30**, 185-194 (1999), *Ultramicroscopy* **58** n.3-4 p.353 (1995)].

**Mössbauer-effect studies of impurities in metals:** Used Mössbauer spectroscopy on the <sup>119</sup>Sn isotope to study local dynamics and electronic properties of Sn impurities in Ag, Pb and Au metal hosts. Unusually large dynamics of Sn atoms was found at high temperatures, providing new clues into the role of point defects on lowering the melting temperature of dilute binary alloys [*Phys. Rev. B* **47**, 14032 (1993), *J. Phys. Cond. Matt.* **10**, 8573 (1998)].

#### MENTORING AND TEACHING EXPERIENCE

Directed research work of Post-doctoral appointees (5), Graduate students (3),  
and visiting scientists (3) 2001-Present

Teaching Assistant, University of Washington 1992-1993  
Led problem session of electrodynamics courses for advanced undergraduate students.

Teaching Assistant, Technion 1989-1990  
Laboratory instructor for introductory physics courses.

#### COMPUTER EXPERTISE

Experience in FORTRAN and C scientific programming. Experience with script language programming (PERL, C-shell) as well as working knowledge of UNIX and LINUX operating systems and a variety of software running on these platforms.

#### SOFTWARE DEVELOPMENTS

- Wrote a generalized code to retrieve magnetization density profiles in multilayers from fits of magnetic reflectivity data using the first Born approximation (1999-2001).
- Wrote a generalized Kramers-Krönig code to obtain accurate charge and magnetic anomalous scattering factors from XANES and XMCD measurements (2000-2001).
- Wrote a generalized code to simulate site-specific x-ray resonant dichroic diffraction of CP x-rays from crystals using ab-initio calculations of resonant scattering factors (2002-2004).
- Wrote a generalized code to correct X-ray Absorption Near Edge Structure (XANES) data for self absorption effects in fluorescence experiments (1998).

#### LANGUAGES

Fluent in English, Spanish and Hebrew.

#### AWARDS

Fellow American Physical Society (Division of Condensed Matter Physics) 2015  
Advanced Photon Source Users Organization Excellence in Beamline Science Award 2015  
Argonne National Laboratory's Inventor Award 2009

## FUNDING

Laboratory Directed Research and Development (LDRD) funding (\$980 K):

<i>Tuning electronic structure at high pressures: towards novel materials discovery from x-ray science under extreme conditions</i>	\$157 K \$260 K \$117 K	2012 2011 2010
<i>An Integrated x-ray and neutron approach to magnetic depth-profiling in nanostructures</i>	\$60 K \$110 K \$80 K	2008 2007 2006
<i>Site-specific magnetism in crystals</i>	\$96 K \$100 K	2005 2004

## PATENTS

*Digital Lock-in detection of site-specific magnetism in magnetic materials* No. 7,403,592 2008

## BOOK Chapters

*Hard x-ray resonant techniques for studies of nanomagnetism*, G. Srajer, J. C. Lang and D. Haskel, in *Modern Techniques for Characterizing Magnetic Materials* (Y. Zhu, Editor), Kluwer academic publishers, Chapter 5, pp. 201-227 (2005).

## REVIEW Articles

Charge-magnetic interference resonant scattering studies of ferromagnetic crystals and thin films,  
D. Haskel, E. Kravtsov, Y. Choi, J.C. Lang, Z. Islam, G. Srajer, J.S. Jiang, S.D. Bader, and P.C. Canfield  
Eur. Phys. J. Special Topics 208, 141-155 (2012)

## OTHER ACTIVITIES

- International Scientific Advisory Committee, REXS 2016 (Hamburg, Germany) June 2016
- International Advisory and Program Committee, XAFS16 (Karlsruhe, Germany) August 2015
- Panelist, NSF-DMR Condensed Matter Physics- Magnetism February 2015
- Editorial Board Member, Scientific Reports, a *Nature* Journal April 2013-present
- Secretary/Treasurer of the International x-ray absorption society (IXAS) July 2012- present
- Member, Scientific Software Audit and Advisory Panel, Diamond Light Source, UK Oct 2012
- Organizer, "Spectroscopy of Rare-earth Materials at Extreme Conditions: Structure, Magnetism, and Energy", ANL May 2012
- Local Organizing Committee, International School and Symposium on Multifunctional Molecule-based materials, ANL March 2011
- Organizer, 1<sup>st</sup> North American Core Shell Spectroscopy Conference (NACSSC) August 2010
- Organizer and Chair, Edward A. Stern Symposium at NACSSC August 2010
- Neutron and x-ray scattering ANL summer school instructor (XMCD) 2002-present
- XAFS summer school instructor (XAFS and other techniques) 2005-2008
- Member General User Program spectroscopy panel (Chair 2007). 2006-2008
- Reviewer, Physics journals and DOE/NSF proposals 1996-Present
- Organizer, Workshop on Novel Science with Polarized x-rays, ANL 2007
- Chairs sessions at National and International conferences 2005-present

- Scientific Advisory committee member for various conferences 2006-present

#### PROFESSIONAL ASSOCIATIONS

Member of the American Physical Society  
 Member of the International XAFS Society

SELECTED PUBLICATIONS (125 publications; WOS: 3013 citations, h-index=27; Google scholar: 3724 citations; h-index=31)

*Pressure Tuning of the Spin-Orbit Coupled Ground State in Sr<sub>2</sub>IrO<sub>4</sub>*, **D. Haskel**, G. Fabbris, Mikhail Zhernenkov, P. P. Kong, C. Q. Jin, G. Cao, and M. van Veenendaal, *Physical Review Letters* 109, 027204 (2012)

*Reentrant Valence Transition in EuO at High Pressures: Beyond the Bond-Valence Model*  
 N. M. Souza-Neto\*, J. Zhao, E. E. Alp, G. Shen, S.V. Sinogeikin, G. Lapertot, and **D. Haskel\***  
*Physical Review Letters* 109, 026403 (2012)

*Orbital magnetism and spin-orbit effects in the electronic structure of BaIrO<sub>3</sub>*  
 Ma. A. Laguna-Marco\*, **D. Haskel\***, N. Souza-Neto, J. Lang, V. Krishnamurthy, S. Chikara, Gang Cao, M. van Veenendaal\*, *Physical Review Letters*, 105, 216407 (2010)

Pressure induced electronic mixing and enhancement of ferromagnetic order in EuX(X=O,S,Se,Te) magnetic semiconductors N. Souza-Neto\*, **D. Haskel\***, Y.C. Tseng, G. Lapertot, *Physical Review Letters* 102, 057206 (2009).

*Role of Ge in Bridging Ferromagnetism in the Giant Magnetocaloric Gd<sub>5</sub>(Si<sub>x</sub>Ge<sub>1-x</sub>)<sub>4</sub> Alloys* **D. Haskel**, Y. B. Lee, B. Harmon, Z. Islam, J. Lang, G. Srayer, Y. Mudryk, K .A. Gschneidner, V. K. Pecharsky, *Physical Review Letters* 98, 247205 (2007).

*Atomic Origin of Magnetocrystalline anisotropy in Nd<sub>2</sub>Fe<sub>14</sub>B* **D. Haskel**, J. Lang, Z. Islam, A. Cady, G. Srayer, M. van Veenendaal, P. Canfield, *Physical Review Letters* 95, 217207 (2005).

*Enhanced Interfacial Magnetic Coupling of Gd/Fe Multilayers* **D. Haskel**, G. Srayer, J. Lang, J.Pollmann, C. Nelson, J. Jiang, S. Bader. *Physical Review Letters* 87, 207201 (2001).

*Dopant and temperature induced phase transitions in LaSrCuO by XAFS* **D. Haskel**, E. A. Stern, D. G. Hinks, A. W. Mitchell, J. Jorgensen and J. Budnick. *Physical Review Letters* 76, 439 (1996).

SELECTED PRESENTATIONS (84 talks, 57 invited)

(Invited) *Pressure-tuning of the spin-orbit coupled ground state of Sr<sub>2</sub>IrO<sub>4</sub>*  
 March Meeting, American Physical Society, Baltimore, USA March 18-22 (2013)

(Invited) *X-ray absorption spectroscopy at high pressure*  
 Seminar, Diamond Light Source, Oxfordshire, United Kingdom (October 2012)

(Invited) *Probing Spin-Orbit interactions in BaIrO<sub>3</sub> with x-ray absorption spectroscopy*  
 Workshop on Physics driven by Spin-orbit coupling in TM compounds, IOP, CAS Beijing, China (2011)

(Invited) *Charge-Magnetic Interference hard x-ray resonant scattering studies of ferromagnetic crystals and thin films*, Resonant Elastic X-ray Scattering (REXS 2011) conference, Aussois, France (2011)

(Invited) *Squeezing Magnets- and what can we learn from it* ; Seminar, Department of Materials Physics, Universidad Complutense de Madrid, Madrid, Spain (March 2009)

(Invited) *Site-specific Magnetic Spectroscopy of Functional Materials*; 6<sup>th</sup> International Conference on Synchrotron Radiation in Materials Science (SRMS-6) Campinas, Brazil (July 2008)

(Invited) *The role of Ge in mediating FM interactions in Gd<sub>5</sub>Si<sub>x</sub>Ge<sub>1-x</sub> alloys*; Condensed Matter Physics Seminar, Instituto de Ciencia de Materiales de Aragon, University of Zaragoza, Zaragoza, Spain (March 2007)

(Invited) *Element- and site-specific study of the atomic origin of magnetic hardness in modern magnets*, Symposium on “Combined XAS and XRD techniques in Physics, Chemistry and Materials Science”, XX Congress of the International Union of Crystallography (IUCR), Florence, Italy (August 2005)

(Invited) *Hard x-ray magnetic studies at the Advanced Photon Source*. Strategic meeting of users of x-ray absorption spectroscopy at ALBA, Sevilla, Spain (October 2004).

(Invited) *Element and site-specific magnetism: X-ray studies in the absorption and diffraction channels*. Physics Colloquium, University of Nebraska, NE, USA (January, 2004).

(Invited) *Dopant Structural distortions in High Tc superconductors: Active or Passive Role?* The 11<sup>th</sup> International XAFS conference (XAFS11), Ako, Japan (2000).

(Invited) *Role of Sr dopants in the inhomogeneous ground state of La(2-x)Sr(x)CuO(4)* Phase transitions and self organization in electronic and molecular networks, Cambridge University, Cambridge, U.K. (2000).

## List of Publications (125 publications, 3013 citations, h-index=27)

### 2015

1. Effect of chemical pressure on the magnetic ground states of the Osmate double perovskite SrCaCoOO<sub>6</sub> and Ca<sub>2</sub>CoOsO<sub>6</sub>, R. Morrow, J. Yan, M. McCuire, J. Freeland, D. Haskel, P. Woodward, Phys. Rev. B 92, 094435 (2015)
2. Sr<sub>2</sub>Ir<sub>1-x</sub>Rh<sub>x</sub>O<sub>4</sub> (x<0.5): An inhomogeneous Jeff=1/2 Hubbard system, S. Chikara, D. Haskel, J-H Sim, H-S Kim, C-C Chen, G. Fabbris, L. Veiga, N. Souza-Neto, J. Terzic G. Cao, M.J. Han, V. van Veenendaal, Phys. Rev. B (Rapid Communications) 92, 081114 (R) (2015).
3. Electronic structure, local magnetism and spin-orbit effects of Ir(IV), IR(V) and Ir(VI) based compounds, M. A. Laguna Marco, P. Kayser, J. Alonso, M. Martinez-Lope, M. van Veenendaal, Y. Choi, D. Haskel, Phys. Rev. B 91, 214433 (2015).
4. Fragility of double exchange interactions and pressure tuning of magnetism in 3d-5d double perovskite Sr<sub>2</sub>FeOsO<sub>6</sub>, L. Veiga, G. Fabbris, M. van Veenendaal, N. Souza Neto, H. Feng, K. Yamaura, D. Haskel, Phys. Rev. B 91, 235135 (2015).
5. Itinerant ferromagnetism in the As 4p conduction band of Ba<sub>0.6</sub>K<sub>0.4</sub>Mn<sub>2</sub>As<sub>2</sub> identified by x-ray magnetic circular dichroism, B. Ueland, A. Pandey, Y. Lee, A. SApkota, Y. Choi, D. Haskel, R. Rosenberg, J. Lang B. Harmon, D. Johnston, A. Kreyssig, A. Goldman, Phys. Rev. Lett. 114, 217001 (2015).
6. Depth resolved magnetic and structural analysis of relaxing epitaxial Sr<sub>2</sub>CrReO<sub>6</sub>, J. Lucy, A. Hauser, Y. Liu, H. Zhou, Y. Choi, D. Haskel, S. te Velthuis, F. Yang, Phys. Rev. B 91, 094413 (2015).

7. Anomalous pressure dependence of magnetic ordering temperature in Tb revealed by resistivity measurements to 141 GPa: Comparison with Gd and Dy, J. Lim, G. Fabbris, D. Haskel, J. S. Schilling, Phys. Rev. B 91, 174428 (2015).
8. Hyperhoneycomb Iridate beta-Li<sub>2</sub>IrO<sub>3</sub> as a platform for Kitaev Magnetism, T. Takayama, A. Kato, R. Dinnebier, J. Nuss, H. Kono, L. Veiga, G. Fabbris, D. Haskel, H. Takagi, Phys. Rev. Lett. 114, 077202 (2015).
9. Electronic and structural ground state of heavy alkali metals at high pressure , G. Fabbris, J. Lim, L. Veiga, D. Haskel, and J. Schilling, Phys. Rev. B 91, 085111 (2015).
10. Magnetic ordering at anomalously high temperatures in Dy at extreme pressures, J. Lim, G. Fabbris, D. Haskel and J. S. Schilling, Phys. Rev. B 91, 045116 (2015).
11. Ground-state wave function of plutonium in PuSb as determined via x-ray magnetic circular dichroism, M. Janoschek, D. Haskel, J. Fernandez-Rodriguez, M. van Veenendaal, J. Rebizant, G. H. Lander, J. X. Zhu, J. D. Thompson, E. D. Bauer, Phys. Rev. B. 91, 035117 (2015).

### 2014

12. Competition between heavy fermion and Kondo interaction in isoelectronic A-site-ordered perovskites, D. Meyers, S. Middey, J.G. Cheng, S. Mukherjee, B. A. Gray, Y. Cao, J.S. Zhou, J. B. Goodenough, Y. Choi, D. Haskel, J.W. Freeland, T. Saha-Dasgupta, J. Chakhalian, Nature Communications 5, 5818 (2014)
13. *Polar Cation Ordering: A Route to Introducing > 10% bond strain into layered oxide films*, B. Nelson-Cheeseman, H. Zhou, P. Balachandran, G. Fabbris, J. Hoffman, D. Haskel, J. Rondinelli, A. Bhattacharya, Advanced Functional Materials 24, 6884 (2014)
14. *Robust ferromagnetism in the compressed permanent magnet Sm<sub>2</sub>Co<sub>17</sub>*, J. Jeffries, L. Veiga, G. Fabbris, D. Haskel, P. Huang, N. Butch, S. McCall, K. Holliday, Z. Jenei, Y. Xiao, P. Chow, Phys. Rev. B 90, 104408 (2014)
15. *Proximity effects on dimensionality and magnetic ordering in Pd/Fe/Pd trilayers*, T. Hase, M. Brewer, U. Arnalds, M. Ahlberg, V. KApaklis, M. Bjorck, L. Bouchenoire, P. Thompson, D. Haskel, Y. Choi, J. Lang, C. Sanchez-Hanke, B. Hjorvarsson, Phys. Rev. B, 90, 104403 (2014)
16. *Different response of transport and magnetic properties of BaIrO<sub>3</sub> to chemical and physical pressure*, M. A. Laguna-Marco, G. Fabbris, N. Souza-Neto, S. Chikara, J. S. Schilling, G. Cao, D. Haskel, Phys. Rev. B 90, 014419 (2014).
17. *Origin of the volume collapse under pressure in elemental Dy*, J. Lim, G. Fabbris, D. Haskel and J.S. Schilling, Journal of Physics: Conference Series 500, 192009 (2014).
18. *Magnetic structure in epitaxially strained Sr<sub>2</sub>CrReO<sub>6</sub> thin films by element-specific XAS and XMCD*, A. Hauser, J. Lucy, M. Gaultois, M. Ball, J. Soliz, Y. Choi, O. Restrepo, W. Windl, J. Freeland, D. Haskel, P. Woodward, F. Yang, Phys. Rev. B 89, 180402 (2014).

### 2013

19. *Different routes to pressure-induced volume collapse transitions in gadolinium and terbium metals*, G. Fabbris, T. Matsuoka, J. Lim, J. R. L. Mardegan. K. Shimizu. D. Haskel, J. S. Schilling, Phys. Rev. B. 88, 245103 (2013).
20. *Pressure induced amorphization and collapse of magnetic order in the type-I clathrate Eu<sub>8</sub>Ga<sub>1</sub>Ge<sub>30</sub>*, J. Mardegan. G. Fabbris, L. Veiga, C. Adriano, M. Avila, D. Haskel, C. Giles, Phys. Rev. B 88, 144105 (2013).
21. *Modification of magnetic anisotropy through 3d-4f coupling in La<sub>0.75</sub>Pr<sub>0.25</sub>Co<sub>2</sub>P<sub>2</sub>*, K. Kovnir, C. Thompson, V. Garlea, D. Haskel, A. Polyanskii, H. Zhou, M. Shatruk, Phys. Rev. B 88, 104429 (2013).
22. *Electronic contribution to the enhancement of the magnetic ordering temperature by Si substitution in Gd<sub>5</sub>(SixGe<sub>1-x</sub>)<sub>4</sub>*, Y.C. Tseng, D. Paudyal, Ya. Mudryk, V. Pecharsky, K. Gschneidner, D. Haskel, Phys. Rev. B 88, 054428 (2013).
23. *Local structure, stripe pinning and superconductivity at high pressure in La<sub>1.875</sub>Ba<sub>0.125</sub>CuO<sub>4</sub>*, G. Fabbris, M. Hucker, G. Gu, J. Tranquada, D. Haskel, Phys. Rev. B (Rapid Communications) 88, 060507 (2013).
24. Pressure-induced volume collapse and structural phase transitions in SrRuO<sub>3</sub>, M. Zhernenkov, G. Fabbris, O. Chmaissem, J. Mitchell, H. Zheng, D. Haskel, Journal of Solid State Chemistry 205, 177-182 (2013).

## 2012

25. *Pressure-induced tuning of a magnetic phase separation in Nd<sub>0.53</sub>Sr<sub>0.47</sub>MnO<sub>3</sub>*  
M. Baldini, Y. Ding, S. Wang, Y. Lin, C. A. Tulk, A. M. dos Santos, J. F. Mitchell, D. Haskel, and W. L. Mao, Phys. Rev. B 86, 094407 (2012)
26. *Charge-magnetic interference resonant scattering studies of ferromagnetic crystals and thin films* (Invited Review), D. Haskel, E. Kravtsov, Y. Choi, J.C. Lang, Z. Islam, G. Srager, J.S. Jiang, S.D. Bader, and P.C. Canfield, Eur. Phys. J. Special Topics 208, 141-155 (2012)
27. *Reentrant Valence Transition in EuO at High Pressures: Beyond the Bond-Valence Model*  
N. M. Souza-Neto, J. Zhao, E. E. Alp, G. Shen, S.V. Sinogeikin, G. Lapertot, and D. Haskel  
Phys. Rev. Lett. 109, 026403 (2012)
28. *Pressure Tuning of the Spin-Orbit Coupled Ground State in Sr<sub>2</sub>IrO<sub>4</sub>*, D. Haskel, G. Fabbris, Mikhail Zhernenkov, P. P. Kong, C. Q. Jin, G. Cao, and M. van Veenendaal , Phys. Rev. Lett 109, 027204 (2012)
29. *High-pressure tuning of valence and magnetic interactions in Eu<sub>0.5</sub>Yb<sub>0.5</sub>Ga<sub>4</sub>* , G. D. Loula, R. D. dos Reis, D. Haskel, F. Garcia, N. M. Souza-Neto, and F. C. G. Gandra , Phys. Rev. B 85, 245128 (2012)
30. *Synchrotron x-ray spectroscopy studies of valence and magnetic state in europium metal to extreme pressures*, W. Bi, N.M. Souza-Neto, D. Haskel, G. Fabbris, E. E. Alp, J. Zhao. R.G. Hennig, M.M. Abd-Elmeguid, Y. Meng ,R. W. McCallum, K. Dennis, J. S. Schilling, Phys. Rev. B 85, 205134 (2012)
31. *Influence of the Fe content on the Gd magnetic ordering temperature in Ni<sub>x</sub>Fe<sub>1-x</sub>/Gd multilayers*  
R. Ranchal, Y. Choi, M. Romera, J. W. Freeland, J. L. Prieto, and D. Haskel Phys. Rev. B 85, 024403 (2012)
32. *Interfacial magnetic coupling between Fe nanoparticles in Fe-AG granular alloys*  
J. Alonso, M. L. Fdez-Gubieda,G. Sarmiento, J. Chaboy, R. Boada, A. Garcia Prieto, D. Haskel, M. A. Laguna Marco,J. Lang. C. G. Meneghini,L. Fernandez Barquin, T. Neisius, I Orue  
Nanotechnology 23, 02570 (2012)

## 2011

33. *Stability of the ferromagnetic ground state of La<sub>2</sub>MnNiO<sub>6</sub> against large compressive stress*  
D. Haskel, G. Fabbris, N. M. Souza-Neto, M. van Veenendaal, G. Shen, A. E. Smith, M. A. Subramanian Phys. Rev. B. (Rapid Communications) 84, 100403(R) (2011)
34. *Effect of Si doping and applied pressure upon magnetostructural properties of Tb<sub>5</sub>(SixGe<sub>1-x</sub>)<sub>4</sub> magnetocaloric compounds* Y.C. Tseng, H-J Ma, C-Y Yang, Y. Mudryk, V. Pecharsky, K. Gschneidner, N. Souza-Neto, D. Haskel Phys. Rev. B. 83, 104419 (2011)

## 2010

35. *Application of Polarized Neutron Reflectometry and X-ray resonant magnetic reflectometry for determining the inhomogeneous magnetic structure in Fe/Gd multilayers*  
Evgeny Kravtsov, Daniel Haskel, S. G. E. te Velthuis, J. S. Jiang, B. J. Kirby  
Bulletin of the Russian Academy of Sciences: Physics, Vol. 74, pp.1471-1473 (2010)
36. *Orbital magnetism and spin-orbit effects in the electronic structure of BaIrO<sub>3</sub>* Ma. Angeles Laguna-Marco, Daniel Haskel, Narcizo Souza-Neto, Jonathan Lang, Vemuru Krishnamurthy, Sharine Chikara, Gang Cao, Michel van Veenendaal, Phys. Rev. Lett. 105, 216407 (2010)

## 2009

37. *Temperature dependence of Eu 4f and Eu 5d magnetizations in the filled skutterudite EuFe<sub>4</sub>Sb<sub>12</sub>*, V.V. Krishnamurthy, D. Keavney, D. Haskel, J. Lang, G. Srager, B. Sales, D. Mandrus, J. Robertson Physical Review B 79, 014426 (2009).
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## ORAL PRESENTATIONS (84 total, 57 invited)

1. (Invited) Magnetism at high pressure probed with x-ray resonant absorption and scattering techniques, Condensed Matter Physics Seminar, University of Missouri, Columbia Mo (September 16, 2015).
2. (Invited) Magnetism at high pressure probed with x-ray resonant absorption and scattering techniques, Joint AIRAPT-25 and EHPRG-53, Madrid, Spain (August 2015).
3. (Invited) X-rays and Magnetism- Part I and Part II (2 lectures), SyncLight 2015, Sao Paulo School of Advanced Sciences on recent developments in Synchrotron radiation, Campinas, Sao Paulo, Brazil (July 2015)
4. (Invited) Frustration in AFM square lattice of Jeff=1/2 moments at high pressure, Competing interactions and colossal responses in transition metal oxides, Telluride, Colorado (June 8-12, 2015).
5. (Invited) Frustration in AFM square lattice of Jeff=1/2 moments at high pressure, Enhanced Functionalities in 4d and 5d transition metal compounds from large spin-orbit coupling, Telluride, Colorado (June 14-18, 2015).
6. (Invited) Possible quantum spin liquid state in square lattice of Jeff=1/2 moments at high pressure, Spin orbit coupling and magnetism in correlated transition metal oxides workshop, Ohio State University (May 4-7, 2015).
7. (Invited) XAFS and other techniques. XAFS14: a short course on methods and applications of XAFS (Nov 13-15, 2014).
8. (Invited) X-ray spectroscopy and high pressure tuning of the S-O coupled ground state of Iridate (5d) oxides, Condensed Matter Physics Seminar, University of Notre Dame (October 9, 2014).
9. (Invited) Recent progress in high pressure studies of magnetism using polarized x-ray techniques, 2014 Annual Users Meeting, Argonne National Laboratory (May 14, 2014)
10. (Invited) Magnetism at High Pressures, Colloquium, Materials Science Division, Argonne National Laboratory (May 8, 2014)

11. (Invited) High pressure studies of magnetism using polarized x-ray techniques: Present and Future, Workshop Extreme Conditions Experiments for today and at Sirius, LNLS/CNPEM, March 13-14, 2014 (Campinas, Brazil)
12. (Invited) X-ray spectroscopy and high-pressure tuning of the spin-orbit coupled ground state of Iridate oxides, Condensed Matter Seminar, Department of Physics, Ohio State University, October 10, 2013 (Ohio, USA)
13. (Invited) Tuning the Spin-orbit coupled ground state of Sr<sub>2</sub>IrO<sub>4</sub> with Pressure, Workshop on Opportunities to study magnetism and related phenomena in 4d and 5d systems, July 22-24, 2013 (ORNL, TN, USA)
14. (Invited) Instrumentation for high pressure studies of magnetism using polarized x-ray techniques, "High Pressure" satellite workshop to Synchrotron radiation instrumentation (SRI2013), June 17, 2013 (Gaithersburg, MD USA)
15. (Invited) X-ray spectroscopy and high-pressure tuning of the S-O coupled ground state of iridate (5d) oxides, Condensed matter and biological Physics Seminar, Washington University in St. Louis, April 29, 2013 (St. Louis, USA)
16. (Invited) Tuning the spin-orbit coupled ground state of Iridates with pressure, March meeting American Physical Society, March 18-22, 2013 (Baltimore, USA)
17. (Contributed) Pressure tuning of the spin-orbit coupled ground state of Sr<sub>2</sub>IrO<sub>4</sub>, 12<sup>th</sup> Joint MMM-Intermag Conference, Jan 14-18, 2013 (Chicago, USA)
18. (Contributed) DOE CD-2 Review of the APS Upgrade, APS, ANL (December 5, 2012)
19. (Invited) X-ray absorption spectroscopy at high pressures, Diamond Light Source, Oxfordshire, United Kingdom (October 12, 2012).
20. (Invited) Electronic ground state properties of Iridate oxides from x-ray absorption spectroscopy, Kentucky Condensed Matter Physics Symposium: The Iridates, Lexington KY (April 28-29, 2012).
21. (Contributed) Electronic ground state properties of Iridate oxides from x-ray absorption spectroscopy, March Meeting American Physical Society, Boston MA (Feb 27-29, 2012).
22. (Invited) *Magnetism at High Pressures* DOE/BES Triennial review of the Advanced Photon Source, Argonne IL (September 12-15, 2011)
23. (Invited) *Magnetism at High Pressures*, University of Chicago review of APS Science (July 27-29, 2011)
24. (Invited) *Probing Spin-Orbit interactions in BaIrO<sub>3</sub> with x-ray absorption spectroscopy* Workshop on Physics driven by Spin-orbit coupling in TM compounds, IOP, CAS Beijing, China (June20-June22 2011)
25. (Invited) *Charge-Magnetic Interference hard x-ray resonant scattering studies of ferromagnetic crystals and thin films* Resonant Elastic X-ray Scattering (REXS 2011) conference, Aussois, France (June13-June18 2011)
26. (Invited) *Interplay between structure and magnetism in Gd<sub>5</sub>(SixGe<sub>1-x</sub>)<sub>4</sub> alloys* Symposium on Magnetic Materials for Energy applications, TMS Annual Meeting, San Diego, CA (February 27-March 3 2011)
27. (Contributed) *Magnetism at High Pressures* 1st North American Core Shell Spectroscopy Conference (NACSSC), Denver Colorado (August 2010)
28. (Invited) Probing Magnetism with X-rays: New tools, New insights, Condensed Matter Physics Seminar, Washington University St. Louis (April 2010).
29. (Contributed) *Coexistence of weak ferromagnetism and superconductivity in Ru-1222* March Meeting of the American Physical Society, Portland Oregon (March 2010)
30. (Contributed) *Coexistence of weak-ferromagnetism and superconductivity in RuSr<sub>2</sub>Eu<sub>1.5</sub>Ce<sub>0.5</sub>Cu<sub>2</sub>O<sub>10</sub>*, 11<sup>th</sup> Joint MMM-Intermag conference, Washington DC (January 2010)
31. (Invited talk) *Complex oxide magnetism at high pressures* 2009 Villa Conference on Complex Oxide Heterostructures (VC-COH), St. Thomas, USVI (September 2009)
32. (Invited talk) *X-ray vision of the inner-workings of functional magnetic materials* Magnetics Conference 2009, Chicago, Illinois USA (April 2009)
33. (Invited talk) *Squeezing Magnets- and what can we learn from it* Physics Colloquium, Northern Illinois University, Illinois, USA (April 2009)

34. (Invited talk) *Squeezing Magnets- and what can we learn from it* Seminar, Department of Materials Physics, Universidad Complutense de Madrid, Madrid, Spain (March 2009)
35. (Invited talk) *Magnetism at High Pressures* Energy Dispersive X-ray Absorption Spectroscopy: Scientific Opportunities and Technical Challenges, ESRF, Grenoble, France (February 2009)
36. (Invited talk) *High-pressure XMCD at the Advanced Photon Source* Workshop in Advances in X-ray absorption spectroscopy under high pressures, 46th EHPRG- European High Pressure Research Group conference, Valencia, Spain (September 2008)
37. (Invited talk) *XAFS and other techniques* XAFS Summer School, Argonne National Laboratory, Argonne IL (August 2008)
38. (Invited) *Site-specific Magnetic Spectroscopy of Functional Materials*, SRMS-6: 6th International Conference on Synchrotron Radiation in Materials Science, Campinas, Brazil (July 2008).
39. (Invited) *High pressure studies of Magnetism using XMCD: the case of giant magnetocaloric material GdSiGe*, 2nd Workshop on Novel Electronic Materials, Lexington Kentucky, USA (May 2008).
40. (Invited) *High pressure studies of magnetism at the Advanced Photon Source*, "In Situ Experiments Under Extreme Conditions Utilizing Synchrotron Radiation", 18th LNLS annual users meeting (RAU) Campinas, Brazil, (February 2008).
41. (Invited) *Magnetic Spectroscopy at High Pressures using XMCD*, International Workshop on Synchrotron High Pressure Mineral Physics and Materials Science, Argonne National Laboratory (December 2007).
42. (Invited) *Magnetic Spectroscopy of Functional Materials*, University of Chicago Review of APS Science, Argonne National Laboratory (September 2007).
43. (Invited) *Magnetic Spectroscopy of Functional Materials*, Scientific Advisory Committee Review of XOR Science, Argonne National Laboratory (September 2007).
44. (Invited) *The role of Ge in mediating FM interactions in Gd<sub>5</sub>Si<sub>x</sub>Ge<sub>1-x</sub> alloys*, Condensed Matter Physics Seminar, Physics Department, Instituto de Ciencia de Materiales de Aragon University of Zaragoza, Zaragoza Spain (March 2007).
45. (Invited) *X-ray studies of the role of Ge in mediating Ferromagnetism in Gd<sub>5</sub>Si<sub>2</sub>Ge<sub>2</sub>*, Physics Seminar, Instituto de Magnetismo Aplicado, Universidad Complutense de Madrid. Madrid Spain (February 2007).
46. (Contributed) *Role of Ge in bridging ferromagnetism in giant magnetocaloric Gd<sub>5</sub>(Ge<sub>1-x</sub>Si<sub>x</sub>)<sub>4</sub>*, 10th Joint MMM/Intermag conference, Baltimore, MD, USA (January 2007).
47. (Invited) *New insights into Permanent Magnets*, 53rd Midwest Solid State Conference, Kansas City, USA (October 2006).
48. (Contributed) *Interplay between structure and magnetism in magnetocaloric material GdSiGe*, Fifth International conference on Synchrotron Radiation in Materials Science (SRMS-5), Chicago, USA (August 2006).
49. (Contributed) *Dichroic resonant diffraction of circularly polarized x-rays: a route to element- and site-specific magnetism*, The 13th International XAFS Conference, XAFS XIII, Stanford University, USA (July 2006).
50. (Invited) *Shedding (x-ray) light into the inner-workings of complex magnetic materials*, Condensed Matter Seminar, Physics Department, University of Notre Dame, Indiana, USA (May 2006).
51. (Contributed) *A new setup for HP-XMCD studies of magnetism at sector 4: First results*, High-Pressure special interest group meeting, Advanced Photon Source, Argonne (April 2006).
52. (Contributed) *Insights into Permanent Magnets*, Advanced Photon Source Operations Monthly Meeting, Argonne, Illinois (December 2005)
53. (Invited) *Inhomogeneous Magnetic States in Gd/Fe and SmCo/Fe Nanolayers*, AVS 52nd International Symposium, Magnetic Nanostructures, surfaces and Interfaces, Boston, USA (November 2005).
54. (Invited) *Element- and site-specific study of the atomic origin of magnetic hardness in modern magnets*, Symposium on "Combined XAS and XRD techniques in Physics, Chemistry and Materials Science", XX Congress of the International Union of Crystallography (IUCR), Florence, Italy (August 2005).
55. (Invited) *XAFS and other techniques*, Advanced Photon Source XAFS Summer School 2005, Argonne, IL, USA (July 2005).

56. (Invited) *XMCD studies of inhomogeneous magnetic states*, Nanomagnetism: Materials and Probes; Workshop at NSLS 2005 annual user's meeting, Brookhaven, Upton, NY, USA (May 2005).
57. (Contributed) *X-ray structural and magnetic studies of the magnetic-martensitic transition in Gd<sub>5</sub>Si<sub>0.5</sub>Ge<sub>3.5</sub>*, March meeting of the American Physical Society, Los Angeles, CA, USA (March 2005).
58. (Invited) *Understanding our best permanent magnets: X-ray studies of element- and site-specific magnetism in Nd<sub>2</sub>Fe<sub>14</sub>B crystals* Department of Chemistry, University of the Republic of Uruguay, Montevideo, Uruguay (December 2004).
59. (Invited) *Hard x-ray magnetic studies at the Advanced Photon Source Strategic meeting of users of x-ray absorption spectroscopy at ALBA*, Sevilla, Spain (October 2004).
60. (Invited) *Beyond element specific magnetism: Magnetic spectroscopy in the diffraction channel* Workshop on Nanomagnetism using X-ray techniques, Lake Geneva, WI (August, 2004).
61. (Invited) *Synchrotron radiation studies of magnetism in layered nanostructures* Nanomagnetism Workshop, Center for Nanoscale Materials first users meeting, Argonne, IL (May, 2004).
62. (Invited) *Site-specific magnetism and the spin-reorientation transition in Nd<sub>2</sub>Fe<sub>14</sub>B permanent magnet* Workshop on interplay of Magnetism and Structure in Functional Materials, Benasque Center for Science, Spain (February, 2004).
63. (Invited) *Element and site-specific magnetism: X-ray studies in the absorption and diffraction channels* Physics Colloquium, University of Nebraska, NE (January, 2004).
64. (Contributed) *Element and site-specific magnetism in Nd<sub>2</sub>Fe<sub>14</sub>B single crystal* 9th Joint MMM/INTERMAG Conference, Anaheim, CA (January, 2004).
65. (Contributed) *Beyond element-specific magnetism in Nd<sub>2</sub>Fe<sub>14</sub>B permanent magnet* DOE-CESP Nanocomposite Magnetic Materials Annual Workshop, Asilomar, CA (October, 2003).
66. (Contributed) *Beyond element specific magnetism: Anomalous diffraction using circularly polarized x-rays* 12th International conference on x-ray absorption fine structure, Malmo, Sweden (June, 2003)
67. (Invited) *X-ray studies of Magnetism: Element Specificity and Beyond* BNL/NSLS Symposium Series, Long Island, New York (2003).
68. (Invited) *X-ray studies of Magnetism: Element Specificity and Beyond* Physics Colloquium, Yeshiva University, New York (2003).
69. (Contributed) *Hard x-rays MCD studies of magnetic phase transitions- with a twist* 47th Conference on Magnetism and Magnetic Materials, MMM02, Tampa, FL, USA (2002).
70. (Invited) *Using Circularly Polarized X-rays to study Layered Magnetic Nanostructures* Symposium on Impact of Scattering on Nanoscience and Technology, 2002 ACA Annual Meeting, San Antonio, TX, USA (2002).
71. (Contributed) *Hard x-ray MCD studies of a surface-driven twisted state in artificial Gd/Fe ferrimagnetic multilayers* DOE-CESP Annual Workshop on Nanocomposite Magnetic Materials, Stony Brook, NY, USA (2002).
72. (Contributed) *Local structure of amorphous V[TCNE]<sub>x</sub> molecular magnet* March meeting of the American Physical Society, Indianapolis, IN, USA (2002).
73. (Invited) *XAFS in Anisotropic Structures: Exploiting angular dependence for better modeling* Workshop on Advanced Methods and Tricks of EXAFS Data Modeling, 2001 NSLS Annual Users' Meeting, NSLS, Brookhaven, USA (2001).
74. (Invited) *Dopant Structural distortions in High Tc superconductors: Active or Passive Role?* The 11th International XAFS conference (XAFS11), Ako, Japan (2000).
75. (Contributed) *Charge Inhomogeneities, Tc suppression and M-I transition in Ni-doped La(2-x)Sr(x)Cu(1-y)Ni(y)O(4)* International Symposium on Physics in Lattice Distortions (LLD2K), Tsukuba, Japan (2000).
76. (Invited) *Role of Sr dopants in the inhomogeneous ground state of La(2-x)Sr(x)CuO(4)* Phase transitions and self organization in electronic and molecular networks, Cambridge University, Cambridge U.K. (2000).
77. (Contributed) *Where do the doped holes go in LaSrCuO? A close look by XAFS* High Temperature Superconductivity (HTS99), Coral Gables, Florida USA (1999).
78. (Contributed) *Structural disorder and the origin of high Tc suppression in LaBaCuO X* International XAFS conference, Chicago USA (1998).

79. (Contributed) *Towards atomic resolution EXELFS?* M.Qian, D.Haskel, E.A.Stern, M.Sarikaya Towards Atomic resolution analaysis (TARA98), Port Ludlow, Washington USA (1998).
80. (Contributed) *Disorder LTT ground state in LaBaCuO* March Meeting of the American Physical Society, Los Angeles, CA USA (1998).
81. (Contributed) *Altered Sr environment in LaSrCuO* Gordon Research conference on High T<sub>c</sub> superconductivity, Ventura, CA USA (1997)
82. (Contributed) *Development of EXELFS for nanoscale atomic structure determination IX* International XAFS conference, Grenoble, France (1996).
83. (Contributed) *Ultimate spatial resolution in the EXELFS of inorganic materials* D.Haskel, M.Qian, M.Sarikaya, E.A.Stern Microscopy Society of America (MSA) Annual meeting, Minneapolis, MN USA (1996).
84. (Contributed) *XAFS studies of phase transitions in LaSrCuO* March meeting of the American Physical Society, San Jose, CA USA (1995).